Rugged Military ACH4600
Flat Panel Display

User's Guide
For
ACH4600
Chassis Mount

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The carton contains the items listed below:

- ACH4600 LCD Display
- Right Angle Power Cord
- Power Cord Retention Bracket
- Remote Control with two AAA batteries
- Product CD containing:
  - This User's Guide
  - QuadView XL User Guide
  - Warranty Guide

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DISPLAY FEATURES

- **Capable of displaying 16,772,166 colors:** The display's high-contrast LCD enhances color vibrancy and improves focus with no geometric distortion.
- **On-Screen Display:** All picture and display functions as well as Audio Volume are controlled using an On-Screen Display (OSD).
- **QuadView XL windowing system:** Capable of displaying four windows with each window capable of displaying Video from four different inputs.
- **Remote Control:** All picture and display functions as well as Audio Volume are controlled using the Remote Control.
- **Multiple Frequency Technology:** Automatically adjusts the display to the video card's scanning frequency, thus displaying the resolution required.
- **Auto Screen size adjustment**: Will adjust display for optional performance and provide full screen images on even non-native formats.
- **DPMS Power Management:** the 4446 features a power management system compliant with the Energy Star program when used with a computer and video card equipped with DPMS.
- **Wide viewing angle:** ±85° typical all directions.
- **Anti-Reflective Screen:** All industrial non-touch models are supplied with Anti-reflective protective safety glass.
- **Power Supply:** All units are supplied with an internal power supply.
- **Low power consumption**.

1. PRODUCT OVERVIEW

This User Guide is for Aydin Displays standard Model 4446 Flat Panel Display with optional QuadView XL windowing system capable of displaying live video and/or computer windows on each of four windows. Each window has four inputs of which only one input can be displayed at a time. The four inputs are as follows:

- RGB / YP_bP_r component
- Composite video
- S-Video
- DVI

All of the input sources can be mixed and matched simultaneously, and each input can be independently scaled, positioned, panned and zoomed.

All QuadView XL functions can be accessed remotely by either RS-232 serial communications or via network control (Ethernet 10/100 BaseT).

For detailed operation of the QuadView XL, please refer to the QuadView XL Users Guide contained on the Product CD or the following RGB Spectrum Web site for the latest revision:

www.rgb.com/en/manuals.asp

With the QuadView XL installed, some of the standard 4446 Display functions, accessible through the OSD, are disabled. The display functions that are enabled are described in this User Guide.

2. CONNECTIONS AND SETUP

To connect the LCD display to your system, follow these instructions:

CAUTION: Turn power off to the computer, display, and power supply before making any connections.

The power ON/OFF switch designations are as follows:

Placing the POWER switch in the ‘ON’ position applies power to all of the internal components of the display and will enable the display.

With the POWER switch in the ‘ON’ position, the display can also be turned ON and OFF by doing the following:

- Using the POWER button on the remote control.
- Through the host interface.
- Using the OSD. Pushing the SELECT button on the front panel when the unit is OFF will display the OSD, which can then be used to power the unit ON.

2.1 Power Connections

AC operating input voltage is 90-132/180-264 VAC Auto-ranging, 47-63 Hz.

Plug the AC Power Cord into the AC power inlet on the rear of the unit.

NOTE: THE POWER CORD RETENTION BRACKET MUST BE INSTALLED WITH THE SUPPLIED HARDWARE TO MEET SHOCK AND VIBRATION.

Connect the AC line power cord to a grounded outlet. For maximum protection, use a good surge protector between the outlet and the power supply to avoid damage to the display due to electrical service abnormalities.

2.2 Signal Connections

The desired video input source is selected using one of the QuadView XL Remote Access interfaces. If the video input connection is different from the Video Source selection, a 'No Sync!' symbol will be displayed, see section 3.1.4.

2.2.1 VGA (YUB) HD15 Signal Connections

The LCD should be connected to a video source using a HD15-male to HD15-male cable. Pin assignments for the HD15 connector are shown below.

Pin	Signal	Pin	Signal
1	Red Video Signal (alternative input V)	9	No Connection
2	Green Video Signal (alternative input Y)	10	Ground
3	Blue Video Signal (alternative input U)	11	No Connection
4	No Connection	12	No Connection
5	No Connection	13	Horizontal Sync Signal
6	Ground for Red Video Signal	14	Vertical Sync Signal
7	Ground for Green Video Signal	15	No Connection
8	Ground for Blue Video Signal		

2.2.2 NTSC Signal Connections

The NTSC inputs use a standard 75-ohm BNC connector.

2.2.3 S-VIDEO Signal Connections

– The S-VIDEO inputs use a standard 4-pin mini-DIN connector. Pin assignments for the 4-pin Mini-Din female connector are shown below.

Pin	Name	Description
1	GND	Ground (Y)
2	GND	Ground (C)
3	Y	Intensity (Luminance)
4	C	Color (Chrominance)

2.2.4 DVI-I Digital/Analog VIDEO Signal Connections

The DVI input uses a DVI-I female connector and supports both analog and digital signals. Pin assignments are shown below.

Pin	Signal	Pin	Signal	Pin	Signal
1	T.M.D.S. DATA 2-	9	T.M.D.S. DATA 1-	17	T.M.D.S. DATA 0-
2	T.M.D.S. DATA 2+	10	T.M.D.S. DATA 1+	18	T.M.D.S. DATA 0+
3	T.M.D.S. DATA 2/4 SHIELD	11	T.M.D.S. DATA 1/3 SHIELD	19	T.M.D.S. DATA 0/5 SHIELD
4	NC	12	NC	20	NC
5	NC	13	NC	21	NC
6	DDC CLOCK	14	+5 POWER	22	T.M.D.S. CLOCK SHIELD
7	DDC DATA	15	GND	23	T.M.D.S. CLOCK+
8	NO CONNECT	16	HOT PLUG DETECT	24	T.M.D.S. CLOCK-

2.3 QuadView XL Remote Control Interfaces

All QuadView XL functions can be accessed remotely by either a RS-232 serial communications interface or via network control (Ethernet 10/100 BaseT) interface.

2.3.1 RS232 Control Signal Connections

The RS232 port uses a standard 9-pin sub-D female connector. Baud rate can be set from 9600 to 115200 baud. Pin assignments are shown below.

Pin	Signal	Pin	Signal	Pin	Signal
1	Carrier Detect (CD)	4	NC	7	Clear to Send (CTS)
2	Transmit Data (TXD)	5	GND	8	Request to Send (RTS)
3	Receive Data (RXD)	6	Data Set Ready (DSR)	9	NC

2.3.2 ETHERNET 10/100 BASE-T Control Signal Connections

The Ethernet connector is a standard 8-pin RJ-45. Pin assignments are shown below.

Pin	Signal	Pin	Signal
1	TX Data +	5	
2	TX Data -	6	RX Data -
3	RX Data +	7	
4		8	

2.4 4446 LCD Display Interfaces

2.4.1 Audio Input Connections (Optional Equipment)

The Audio input connector is a SWITCHCRAFT P/N C3F female connector. Connect the Audio Source to the Audio Input Connector using a SWITCHCRAFT P/N A3M connector (not supplied) and shielded audio cable. Pin assignments are shown below.

Pin	Signal
1	Line +
2	Line -
G	SHIELD

2.4.2 Speaker Output Connections (Optional Equipment)

Connect an 8 ohm speaker to the + and – terminals of the SPEAKER Terminal Block. The terminal block screw size is a # 6 for the FCC unit and #8 for the MIL-461 unit.

2.4.3 Host Computer Interface (RS232) Connections

Connect an RS232 Serial Cable (not provided) to the DB9 female RS232 input connector on the back of the unit to the host computer RS232 Interface. Pin assignments for the DB9 female connector are shown below.

Pin	Signal	Pin	Signal	Pin	Signal
1		4		7	
2	Receive Data (RXD)	5	GND	8	
3	Transmit Data (TXD)	6		9	

2.4.4 Maintenance Interface (RS232) Connections

This interface is for factory use only or for Aydin Customer Service authorized field upgrade of display firmware. Contact Customer Service at 610-404-5370 or fax at 610-404-8186 with requirements for firmware upgrades and procedure. Pin assignments for the DB9 female connector are shown below.

Pin	Signal	Pin	Signal	Pin	Signal
1		4		7	
2	Receive Data (RXD)	5	GND	8	
3	Transmit Data (TXD)	6		9	

3. DISPLAY ADJUSTMENT

If you have any problems connecting, setting up or operating the display, please refer to the Troubleshooting section of this guide.

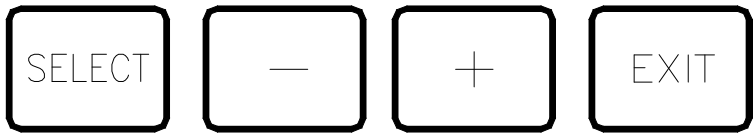
Plug the LCD power cord into an AC power source. The green ON LED will light when the Power Switch is turned ON. When the display has power applied, and either the computer or video card is in power save mode, the amber SAVE LED will also be on.

A typical adjustment sequence is: Width, Horizontal Position, repeat Width, Focus and then Vertical Position. Display height is preset and not adjustable.

3.1 Control Function Buttons

When necessary, the unit is adjusted using the On-Screen Display (OSD) and the Remote Control or the Front Panel pushbuttons:

3.1.1 LCD Adjustment Front Panel Pushbuttons



OSD and SELECT MODE

Enables the Main Menu, Sub Menu, and parameter to be adjusted.

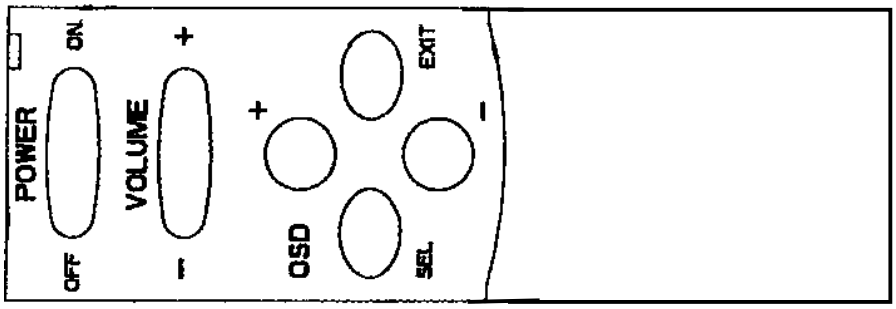
ADJUST & SELECT

The pushbuttons are used to select a main or sub menu and are then used to make the adjustments once a function is selected using the OSD and SELECT MODE key.

EXIT

The EXIT pushbutton is the complement of SELECT MODE and allows you to exit menu selections by returning the user to the previous menu or exiting the OSD.

3.1.2 LCD Adjustment Remote Control Pushbuttons



POWER **ON / OFF**

Enables and Disables the display.

VOLUME (Optional Equipment) **- / +**

Adjusts the volume up and down.

OSD and SELECT MODE

Enables the Main Menu, Sub Menu, and parameter to be adjusted.

ADJUST & SELECT

The pushbuttons are used to select a main or sub menu and are then used to make the adjustments once a function is selected using the OSD and SELECT MODE key.

EXIT

3.1.3 Hot Buttons

ADJUST & SELECT

The Adjustment pushbuttons are used as Hot Buttons to increase or decrease the Backlight Intensity when the OSD is not enabled.

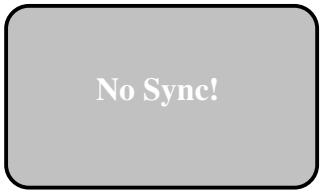
EXIT

The EXIT pushbutton is also a Hot Button for the Auto Adjust Function only when VGA is the Main video source and the OSD is not enabled.

3.1.4 Power Management

When Horizontal or Vertical Sync is not detected, the amber SAVE indicator will light and the No Sync symbol will appear (see below).

When the Horizontal or Vertical Synchronization frequencies being supplied to the unit are not within the range of the AMLCD monitor, or when No Signal is applied, or if the wrong video input source is selected in the display, the No Sync symbol will appear.



To extinguish the No Sync symbol and display an image, do one of the following:

- Supply a format with Horizontal or Vertical Synchronization frequencies that are compatible with the display.

- Connect a video source to the selected video input on the display

3.2 On-Screen Control Function Items

3.2.1 OSD (ON SCREEN DISPLAY) – PRE ADJUSTMENT NOTICE

3.2.1.1 OSD Timeout Period

The OSD (On Screen Display) has a user-selectable Timeout Period.

If the OSD is activated and no front panel or remote control keys are depressed for a period of 5 to 60 seconds, the OSD will automatically deactivate. Any adjustments made prior to timeout will be stored.

If the Timeout Period is set to zero, the OSD will remain continuously enabled, until deactivated by one of the following conditions:

- Pressing the "EXIT" key as often as required to reach and exit the Top Level menu
- Unit power is turned off.

The Timeout Period function is accessed via the OSD/RESET menu.

3.2.1.2 OSD Activation

If the OSD (On Screen Display) is not visible, press the "SELECT" key, once, to activate the OSD.

3.2.1.3 OSD Menu:

Observe the following Top-Level Menu Selection Tabs on the OSD Menu:

- **MAIN**
- **IMAGE (disabled)**
- **PIP (disabled)**
- **COLOR**
- **CONTROLS**
- **OSD/RESET**

MAIN is the default foreground menu; the active menu will always appear in the foreground.

The Selection Tab of the active menu will be highlighted in blue.

Press the "EXIT" key once to deactivate the OSD.

See the OSD – SAMPLE IMAGES section of this document for sample images of OSD menus.

3.2.2 OSD (ON SCREEN DISPLAY) – STORED VALUES

Values chosen during OSD interaction are stored in memory under the following conditions:

- The "**EXIT**" is pressed
- Timeout period expires

Values chosen during OSD interaction are not stored in memory under the following conditions:

- Unit power is turned off prior to pressing the "EXIT" key
- Unit power is turned off prior to the expiration of the timeout period

Values stored in memory are retained indefinitely. Unit power is not required to retain stored values.

3.2.3 OSD MENU NAVIGATION – MAIN MENU (DVI Main Source)

If the OSD is not visible, press the "SELECT" key once to activate the OSD. Observe the following choices in the MAIN Menu Selection List:

- **Source** - (Multiple Sub-Function Selection Buttons)

NOTE:

MAIN Source – (set to **DVI** when the QuadView XL option is installed)

PIP Source - (disabled when the QuadView XL option is installed)

- **Scaling** - (set to **FILL** when the QuadView XL option is installed)

NOTE:

SCALING can only be set to **FILL** when the QuadView XL option is installed.

- **Brightness -** (Level Adjust Function)
- **Contrast -** (Level Adjust Function)
- **Hue -** (Level Adjust Function)
- **Saturation -** (Level Adjust Function)

Press the "SELECT" key again to activate the MAIN menu. The OSD will auto-index to the first selection (Source) on the menu list. The selection will be highlighted with a raised background and a blue indicator dot as per the example below.

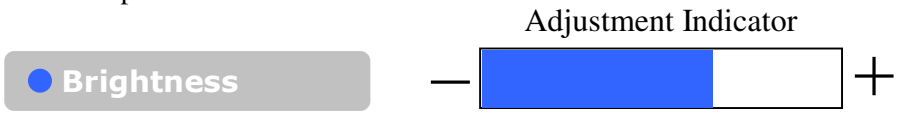
Press the [-] or [+] keys to navigate through the Selection List

When the desired selection is highlighted, press the "SELECT" key to access the highlighted selection

After the desired selection is activated, press the [-] or [+] keys to perform the following:

1) Adjust the desired Level.

Example:



After the desired selection is activated, press the [-] or [+] keys to set the desired level.

Press the "EXIT" key one time to activate the desired level and resume navigation in the MAIN Menu Selection List

Press the "EXIT" key one additional time to resume navigation in the Top- Level OSD menu.

Pressing "EXIT" while in the Top-Level of the OSD menu will deactivate the OSD.

3.2.4 OSD MENU NAVIGATION – COLOR MENU

If the OSD is not visible, press the "SELECT" key once to activate the OSD. Press the [-] or [+] keys to navigate to the COLOR menu.

Observe the following choices in the COLOR Menu Selection List:

- **sRGB** - (Multiple Sub-Function Selection Buttons)
- **Color Temperature** - (Multiple Sub-Function Selection Buttons)
- **Red** - (Level Adjust Function)
- **Green** - (Level Adjust Function)
- **Blue** - (Level Adjust Function)

Press the "**SELECT**" key again to activate the **COLOR** menu. The OSD will auto-index to the first selection (**sRBG**) on the menu list. The selection will be highlighted with a raised background and a blue indicator dot as per the example below:

Press the **[-]** or **[+]** keys to navigate through the Selection List.

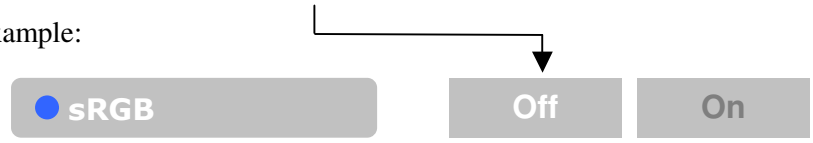
When the desired selection is highlighted, press the "**SELECT"** key to access the highlighted selection.

After the desired selection is activated, press the **[-]** or **[+]** keys to perform the following:

1) ***Choose the desired Sub-Function.***

The currently selected Sub-Function will be distinguished by the white font color displayed on the Selection Button.

Example:

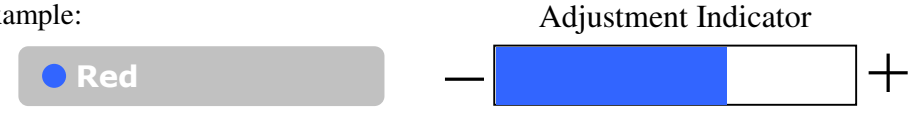


After the desired Sub-Function is highlighted, press the "**SELECT"** key to activate the highlighted Sub-Function.

Press the "**EXIT**" key one time to resume navigation in the Menu Selection List.

2) ***Adjust the desired Level.***

Example:



After the desired selection is activated, press the **[-]** or **[+]** keys to set the desired level.

Press the "**EXIT**" key one time to accept the desired level and resume navigation in the **COLOR Menu** Selection List.

Press the "EXIT" key one additional time to resume navigation in the Top- Level OSD menu.

Pressing "EXIT" while in the Top-Level of the OSD menu will deactivate the OSD.

3.2.5 OSD MENU NAVIGATION – CONTROLS MENU

If the OSD is not visible, press the "SELECT" key once to activate the OSD. Press the [-] or [+] keys to navigate to the CONTROLS menu

Observe the following choices in the CONTROLS Menu Selection List:

- **Power** - (Multiple Sub-Function Selection Buttons)
- **Pattern**- (Multiple Sub-Function Selection Buttons)
- **Backlight** - (Level Adjust Function)
- **Volume** - (Level Adjust Function)

When the **CONTROLS** menu tab is highlighted, press the "**SELECT"** key to access the **CONTROLS** menu. The OSD will auto-index to the first selection (**POWER**) on the menu list. The selection will be highlighted with a raised background and a blue indicator dot as per the example below:

Press the **[-]** or **[+]** keys to navigate through the Selection List.

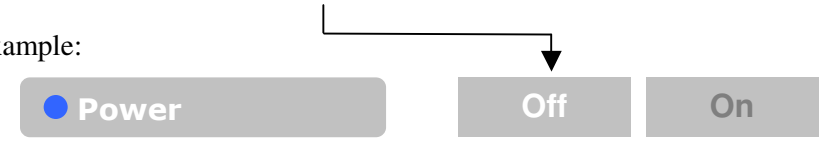
When the desired selection is highlighted, press the "**SELECT"** key to access the highlighted selection.

After the desired selection is activated, press the **[-]** or **[+]** keys to perform the following:

1). Choose the desired Sub-Function.

The currently selected Sub-Function will be distinguished by the white font color displayed on the Selection Button.

Example:

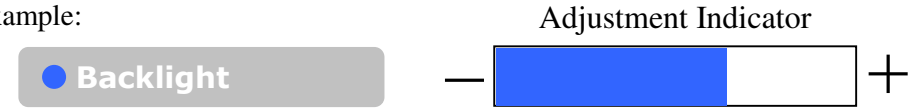


After the desired Sub-Function is highlighted, press the "**SELECT"** key to activate the highlighted Sub-Function.

Press the "**EXIT**" key one time to resume navigation in the Menu Selection List.

2). ***Adjust the desired Level.***

Example:



After the desired selection is activated, press the **[-]** or **[+]** keys to set the desired level.

Press the "**EXIT**" key one time to accept the desired level and resume navigation in the **CONTROLS Menu** Selection List.

Press the "EXIT" key one additional time to resume navigation in the Top- Level OSD menu.

Pressing "EXIT" while in the Top-Level of the OSD menu will deactivate the OSD.

3.2.6 OSD MENU NAVIGATION – OSD/RESET MENU – FACTORY RESET

If the OSD is not visible, press the "SELECT" key once to activate the OSD. Press the [-] or [+] keys to navigate to the OSD/RESET menu

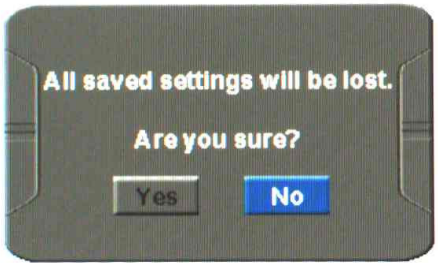
Observe the following choices in the OSD/RESET Menu Selection List:

- **Factory Reset** - (Single Sub-Function Selection Button)
- **Horizontal** - (Level Adjust Function)
- **Vertical** - (Level Adjust Function)
- **Blend** - (Level Adjust Function)
- **Time Out** - (Time Adjust Function)

Press the "SELECT" key again to activate the OSD/RESET menu. The OSD will auto-index to the first selection (Factory Reset) on the menu list. The selection will be highlighted with a raised background and a blue indicator dot. See example below:

The Factory Reset selection has only one Sub-Function Selection Button. The Sub-Function Selection Button for this mode is auto-selected and highlighted in blue with a white font, when Factory Reset is chosen from the selection list. See example below:

Pressing the "SELECT" key when **Factory Reset** is highlighted will activate the **Factory Reset OSD**. The **Factory Reset OSD (On Screen Display)** provides for acceptance or rejection of the **Factory Reset** process. See **Factory Reset OSD** example below:



When the **Factory Reset OSD** is displayed, press the **[-]** or **[+]** keys to select the following:

- **No** *(Default Selection)* **– Do Not Perform Factory Reset**
- **Yes – Perform Factory Reset**

If "**No**" is highlighted, press the "**SELECT"** or "**EXIT**" key to return to the OSD/RESET menu.

If "**Yes**" is highlighted, press the "**SELECT"** key to activate **Factory Reset**. ***All previously saved settings will be lost when Factory Reset is activated.***

3.2.7 OSD MENU NAVIGATION – OSD/RESET MENU – STANDARD FUNCTIONS

If the OSD is not visible, press the "SELECT" key once to activate the OSD. Press the [-] or [+] keys to navigate to the OSD/RESET menu

Observe the following choices in the OSD/RESET Menu Selection List:

- **Factory Reset** - (Single Sub-Function Selection Button)
- **Horizontal** - (Level Adjust Function)
- **Vertical** - (Level Adjust Function)
- **Blend** - (Level Adjust Function)
- **Time Out** - (Time Adjust Function)

Press the "**SELECT**" key again to activate the **OSD/RESET** menu. The OSD will auto-index to the first selection (**Factory Reset**) on the menu list. The selection will be highlighted with a raised background and a blue indicator dot. See example below:

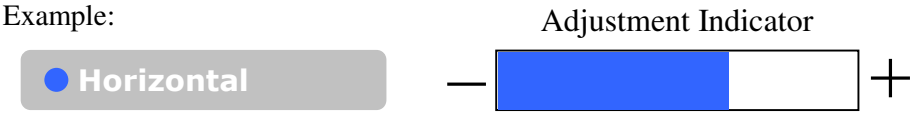
Press the [-] or [+] keys to navigate through the Selection List.

When the desired (non Factory Reset) selection is highlighted, press the "SELECT" key to access the highlighted selection.

After the desired selection is activated, press the [-] or [+] keys to perform the following:

1) ***Adjust the desired Level.***

Example:



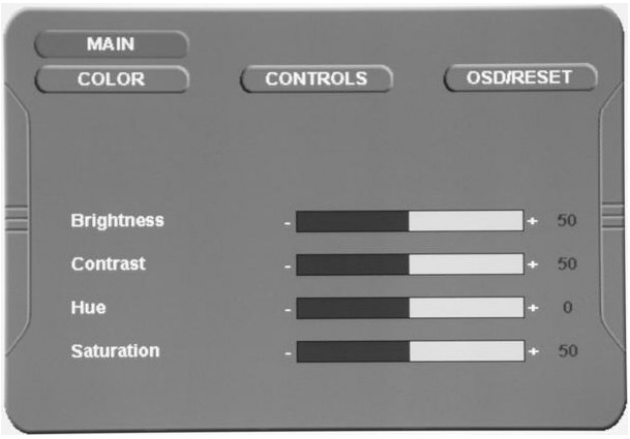
After the desired selection is activated, press the **[-]** or **[+]** keys to set the desired level.

Press the "**EXIT**" key one time to accept the desired level and resume navigation in the **COLOR Menu** Selection List.

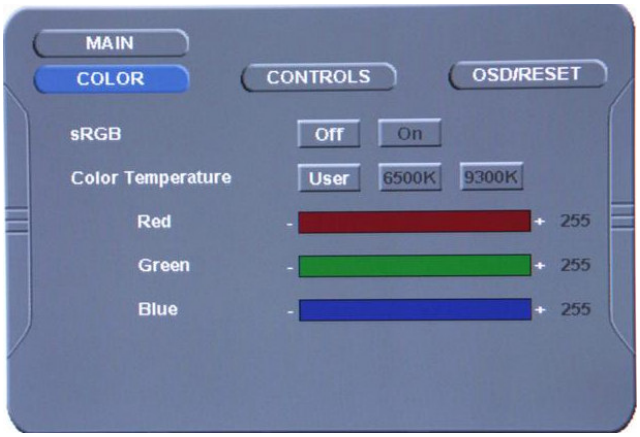
Press the "EXIT" key one additional time to resume navigation in the Top- Level OSD menu.

Pressing "EXIT" while in the Top-Level of the OSD menu will deactivate the OSD.

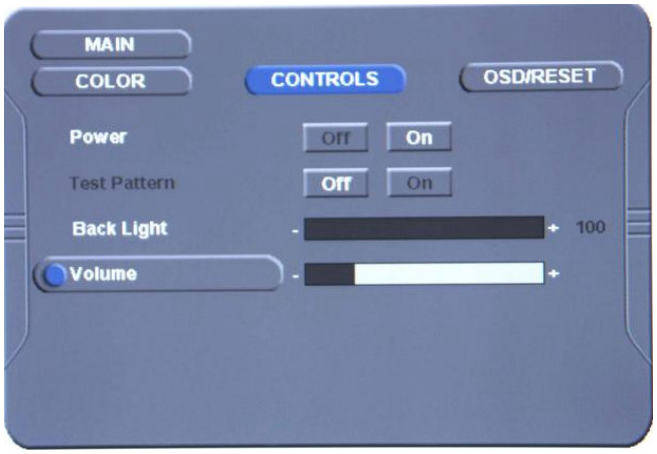
3.2.8 OSD MENU – SAMPLE IMAGES



MAIN

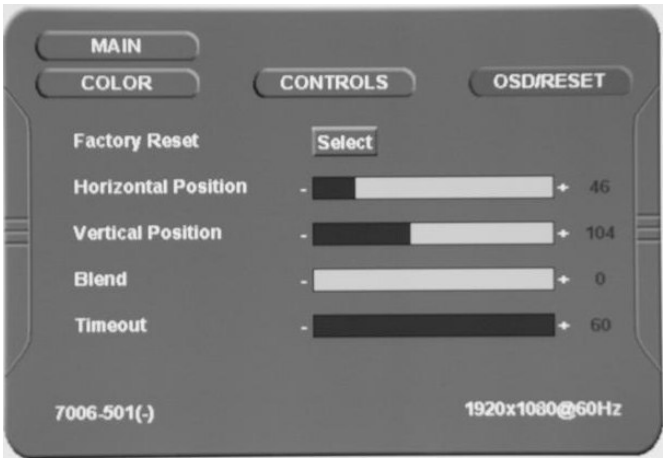


COLOR



CONTROLS W/ AUDIO OPTION

CONTROLS W/O AUDIO OPTION



OSD/RESET

3.2.9 HOST REMOTE DISPLAY INTERFACE (SERIAL CONTROL – RS-232)

3.2.9.1 RS-232 Serial HOST Interface - Interrogation and Control

The RS-232 Serial Interface provides for the interrogation and control of the following display functions:

- A/D Values
- Main Brightness
- Main Contrast
- Main Source Select (DVI only with QuadView XL option)
- PIP (Picture In Picture) Brightness
- PIP (Picture In Picture) Contrast
- PIP (Picture In Picture) Enable
- PIP (Picture In Picture) Horizontal Position
- PIP (Picture In Picture) Size
- PIP (Picture In Picture) Vertical Position
- PIP (Picture In Picture) Source Select

DISABLED WITH QUADVIEW XL

- Controls
- Status (BIT)

3.2.9.2 Interface Protocol

The Interface Protocol is standard asynchronous RS-232 serial I/O

- Start Bit = 1
- Stop Bit = 1
- Data Bits = 8
- Baud Rate = 115.2K
- Handshake = None (Only Transmit "TX" and Receive "RX" lines are used)
- Message Length = 5 bytes

3.2.9.3 READ / WRITE Commands

The "**A/D"** and "**Status (BIT)**" registers are "**READ**" only. All **other** functions accept both "**READ**" and "**WRITE**" commands.

MESSAGE PROTOCOL TABLE

STX	READ / WRITE	ADDRESS	DATA	ETX
0x02	Read = 0x55 Write = 0xAA	0xXX	0xYY	0x03

A **"READ"** command is issued to read the current value of the variable being addressed.

A "**WRITE**" command is issued to change the current value of the variable being addressed. The following are responses for invalid operations:

FF Value is out of range

FE Illegal command

FD Unavailable command

3.2.10 REMOTE DISPLAY INTERFACE – FUNCTION MESSAGES

3.2.10.1 A/D (Analog to Digital) Converter

A/D Address and Value Data Table

Address HEX	Value (VDC)	HEX Data (Read Range)	Value Range HEX (+/- 20%)	Value Range DAC Count	Voltage per Count mV DC
0x**01**	Not Used		N/A	N/A	N/A
0x**02**	1.8	00 - FF	00 – **B4**	0 – **180**	0.01000
0x**03**	2.5		00 – **CE**	0 – **206**	0.01214
0x**04**	3.3		00 – **C6**	0 – **198**	0.01666
0x**05**	5.0		00 – **C7**	0 – **199**	0.02513
0x**06**	12.0		00 - **AD**	0 - **173**	0.06936

A/D Message Example
(Send Request for 5 Vdc Value)

MODE	STX	READ ONLY	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**05**	**00**	**03**
Auto Receive	02	55	05	**C6**	03

Interpreting Received Data

Received **HEX DATA** = **C6**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA C6 = 198 (DAC Count)

Derived Decimal Value = **198** (DAC Count) x **0.02513** (Voltage per Count)
Derived Decimal Value = **4.976**

Received Decimal Equivalent = **4.976 VDC**

A/D Message Example
(Send Request for 12 Vdc Value)

MODE	STX	READ ONLY	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**06**	**00**	**03**
Auto Receive	02	55	06	**A7**	03

Interpreting Received Data

Received **HEX DATA** = **A7**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA A7 = 167 (DAC Count)

Derived Decimal Value = **167** (DAC Count) x **0.06936** (Voltage per Count)
Derived Decimal Value = **11.583**

Received Decimal Equivalent = **11.583 VDC**

3.2.10.2 Main Brightness

Range and Hex Value Data Table

Value Range (%)	HEX Data (Read Range)	HEX Data (Write Range)	Value Range DAC Counts	DAC Offset	Value Range DAC Counts per %
0 - 100	00 – FF	1C – E4	28 – 228	28	2

Main Brightness Message Example
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**11**	**00**	**03**
Auto Receive	02	55	11	**80**	03

Interpreting Received Data

Received **HEX DATA** = **80**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA 80 = **128** (**DAC Count**)

Derived Decimal Value = **128** (DAC Count) - **28** (DAC Offset) = **100**
Derived Decimal Value **= 100** (Count - Offset) / **2** (DAC Counts per %) **= 50**

Received Decimal Equivalent for (Main Brightness) = **50%**

Main Brightness Message Example
(Set Value to 75%)

MODE	STX	WRITE	HEX ADDRESS	HEX DATA	ETX
SEND (**Write** Command)	**02**	**AA**	**11**	**B2**	**03**
Auto Receive	02	AA	11	B2	03

Converting Desired Value (0 - 100%) to HEX DATA

Desired Value = **75%**

Convert Desired Value to (DAC Count)
75% (Desired Value) x **2** (DAC Counts per %) = **150** (DAC Count)
150 (DAC Count) + **28** (DAC Offset) = **178** (DAC Count)

Convert Decimal Value **178** (DAC Count) to HEX DATA
178 (DAC Count) = **B2** (HEX DATA)

Use HEX DATA value **B2** in **SEND (Write)** message string

3.2.10.3 Main Contrast

Range and Hex Value Data Table

Value Range (%)	HEX Data (Read Range)	HEX Data (Write Range)	Value Range DAC Counts	DAC Offset	Value Range DAC Counts per %
0 - 100	00 – FF	1C – E4	28 – 228	28	2

Main Contrast Message Example
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**12**	**00**	**03**
Auto Receive	02	55	12	**80**	03

Interpreting Received Data

Received **HEX DATA** = **80**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA 80 = 128 (**DAC Count**)

Derived Decimal Value = **128** (DAC Count) - **28** (DAC Offset) **= 100**
Derived Decimal Value **= 100** (Count - Offset) / **2** (DAC Counts per %) **= 50**

Received Decimal Equivalent for (Main Contrast) = **50%**

Main Contrast Message Example
(Set Value to 75%)

MODE	STX	WRITE	HEX ADDRESS	HEX DATA	ETX
SEND (**Write** Command)	**02**	**AA**	**12**	**B2**	**03**
Auto Receive	02	AA	12	B2	03

Converting Desired Value (0 - 100%) to HEX DATA

Desired Value = **75%**

Value = 75 (Desired Value) x 2 (DAC Counts per %) = 150
Value = 150 + 28 (DAC Offset) = 178 (DAC Counts)
Value **= 178** (DAC Counts) = **B2** (HEX DATA)

Use HEX DATA value **B2** in **SEND (Write)** message string

3.2.10.4 Controls Power

The Power control function, provides the following options:

- Off
- On

Mode and Hex Value Data Table

Controls Power	HEX Data	HEX Data (Read Range)	HEX Data (Write Range)
Off	00	0 - FF	00 - 01
On	01		

Controls Power Message – Power Off Example (Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**50**	00	**03**
Auto Receive	02	55	50	**00**	03

Interpreting Received Data

HEX DATA = **00**
Received Value = **Power – OFF**

Controls Power Message Example (Set Power to On)

MODE	STX	WRITE	HEX ADDRESS	HEX DATA	ETX
SEND (**Write** Command)	**02**	**AA**	**50**	**01**	**03**
Auto Receive	02	AA	50	01	03

Converting Controls Power Status to HEX DATA

Desired Value = **Power - ON**

Use HEX DATA value **01** in **SEND (Write)** message string

3.2.10.5 Controls Backlight Intensity

Range and Hex Value Data Table

Value Range (%)	HEX Data (Read Range)	HEX Data (Write Range)	Value Range DAC Count	Value Range % Per DAC Count
0 - 100	00 - FF	20 – A2	32 – 162	0.61728

Backlight Intensity Message Example
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**52**	**00**	**03**
Auto Receive	02	55	52	**59**	03

Interpreting Received Data

Received **HEX DATA** = **59**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA 59 = **89** (**DAC Count**)

Derived Decimal Value = **89** (DAC Count) x **0.61728** (% Per Count) = **54.9**
Received Decimal Equivalent for (Backlight Intensity) = **54.9%**

Backlight Intensity Message Example
(Set Value to 75%)

MODE	STX	WRITE	HEX ADDRESS	HEX DATA	ETX
SEND (**Write** Command)	**02**	**AA**	**52**	**79**	**03**
Auto Receive	02	AA	52	79	03

Converting Desired Value (20 - 100%) to HEX DATA Value

Desired Value = **75%**

Convert Desired Value to (DAC Count)
75% (Desired Value) / **0.61728** (% per DAC Count) = **122** (DAC Count)

Convert Decimal Value **122** (DAC Count) to HEX DATA Value
122 (DAC Count) **= 79** (HEX DATA)

Use HEX DATA value **79** in **SEND (Write)** message string

Note: Brightness can be adjusted from a Max. Brightness of 100% to a Min. Brightness of 20% ± 5%.

3.2.10.6 Controls Volume Adjustment (Optional Equipment)

Range and Hex Value Data Table

Value Range (%)	HEX Data (Read Range)	HEX Data (Write Range)	Value Range DAC Count	Value Range % Per DAC Count
0 - 100	00 - FF	00 – A2	0 – 162	0.61728

Volume Message Example
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**53**	**00**	**03**
Auto Receive	02	55	53	**59**	03

Interpreting Received Data

Received **HEX DATA** = **59**
Convert HEX DATA value to Decimal Value to derive (DAC Count)

HEX DATA 59 = **89** (**DAC Count**)

Derived Decimal Value = **89** (DAC Count) x **0.61728** (% Per Count) = **54.9**
Received Decimal Equivalent for (Volume) = **54.9%**

Volume Message Example
(Set Value to 75%)

MODE	STX	WRITE	HEX ADDRESS	HEX DATA	ETX
SEND (**Write** Command)	**02**	**AA**	**53**	**79**	**03**
Auto Receive	02	AA	53	79	03

Converting Desired Value (0 - 100%) to HEX DATA Value

Desired Value = **75%**

Convert Desired Value to (DAC Count)
75% (Desired Value) / **0.61728** (% per DAC Count) = **122** (DAC Count)

Convert Decimal Value **122** (DAC Count) to HEX DATA Value
122 (DAC Count) **= 79** (HEX DATA)

Use HEX DATA value **79** in **SEND (Write)** message string

3.2.10.7 STATUS (BIT)

The status register provides a bit level error flag for each of the A/D values defined below:

A/D VALUES

BIT 7: A/D 12 VDC
BIT 6: A/D 5 VDC
BIT 5: A/D 3.3 VDC
BIT 4: A/D 2.5 VDC
BIT 3: A/D 1.8 VDC
BIT 2: NOT USED (Always 0)
BIT 1: NOT USED (Always 0)
BIT 0: Source = MAIN

A "1" flag will occur under the following conditions:

- The A/D value is greater than (+/- 20%) of the expected nominal value.
- An input signal has been lost.

Status BIT Message Example 1
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**00**	**00**	**03**
Auto Receive	02	55	00	**01**	03

Interpreting Received Data

HEX DATA = **01**
Received Value = **SOURCE** (**MAIN) – Input Signal Lost**

Status BIT Message Example 2
(Send Request for Value)

MODE	STX	READ	HEX ADDRESS	HEX DATA	ETX
SEND (**Read** Command)	**02**	**55**	**00**	**00**	**03**
Auto Receive	02	55	00	**02**	03

Interpreting Received Data

HEX DATA = **02**
Received Value = **SOURCE** (**PIP) – Input Signal Lost**

3.2.11 MENU MAP AND REMOTE FUNCTION CHART

REMOTE ACCESS	MAIN MENU	OPTIONS			
YES	Brightness	Adjustment Bar			
YES	Contrast	Adjustment Bar			
	Hue	Adjustment Bar			
	Saturation	Adjustment Bar			
	COLOR MENU				
	sRGB	Off	ON		
	Color Temperature	User	6500K	9300K	
	Red	Adjustment Bar			
	Green	Adjustment Bar			
	Blue	Adjustment Bar			
	CONTROLS MENU				
YES	Power	Off	ON		
	Pattern	Off			
YES	Backlight	Adjustment Bar			
YES	Volume (Option)	Adjustment Bar			
	OSD / RESET MENU				
	Factory Reset	Select			
	Horizontal	Adjustment Bar			
	Vertical	Adjustment Bar			
	Blend	Adjustment Bar			
	Timeout	Adjustment Bar			

3.3 Dimming Operation

The brightness adjustment allows the operator to adjust the brightness of the display from full Brightness to 20% ± 5% Brightness depending on the user's needs. The Brightness level on the OSD **MAIN** menu is adjusted by the Remote or Front Panel Controls.

4. MAINTENANCE

Field Maintenance should be limited to front panel adjustments, and external cleaning. Any action that requires opening the monitor chassis should be deferred to the depot or factory.

4.1 PREVENTIVE MAINTENANCE

The only periodic maintenance recommended is EXTERIOR SURFACE cleaning when necessary, and the periodic inspection and cleaning of the air filter.

4.1.1 Surface Cleaning

The window and exterior surfaces may be cleaned with standard non-abrasive glass cleaners applied with a soft cloth to avoid scratching the anti-reflective coating on the window.

NOTE: INTERIOR CLEANING OF THE MONITOR IS NEITHER REQUIRED NOR RECOMMENDED.

4.1.2 Image Persistence

Image persistence is the occurrence of a ghost image that remains on the display screen even after the display monitor has been turned off. Unlike cathode ray tube monitors that permanently burn the image into the phosphors, with liquid crystal displays, image persistence is not permanent. LCD's suffering from image persistence can be cleared by turning off the display monitor for a period equivalent to the duration in time that the offending image was displays. If the image was displayed for one hour, turn the monitor off for one hour to erase the ghost image.

NOTE: The use of a screen saver is recommended whenever the screen is idle.

4.2 CORRECTIVE MAINTENANCE

Any corrective maintenance should be deferred to the depot or factory.

4.3 AIR FILTER MAINTENANCE

Depending on the environment, the air filters on the rear panel should be inspected periodically and cleaned as required with clean, dry, low pressure air or rinse with water and dried thoroughly.

5. 4446 SPECIFICATIONS

NOTE

Technical specifications are subject to change without notice.

5.1 LCD Module

- Active matrix thin film transistor (TFT) liquid crystal display (LCD)
- Native Resolution (Pixel Count): 1920 x 1080
- Pixel pitch: 0.1767 mm (H) x 0.530 mm (V)
- Viewing angle: ±85° (typical all directions with more than 10:1 contrast ratio)
- Luminance: 270cd/m^2 White typical (product spec is 450 typ)
- Contrast Ratio: 900:1 typical
- Display colors: 16,777,216
- Diagonal: 46 inches
- Viewable Image Size: 1018.08(H) mm x 572.67(V) mm (40.08 in. x 22.54 in.)
- 1920 x 1080 at 60Hz Native Resolution

5.2 QuadView XL Video Input Characteristics

5.2.1 DVI Input Signal

- Type: DVI – Single Link
- Max. bandwidth: 1.65 Gbps

5.2.2 Analog Input Signal

- Type: Analog RGB/ YP_bP_r
- Analog video: RGB/ YP_bP_r interlaced or non-interlaced
    - Video level: Analog 0 to 0.8 Vp-p (0.7 Vp-p/75 ohms)
    - Sync: Separate Sync TTL Level; Horizontal Sync Positive/Negative; Vertical Sync Positive/Negative; Composite Sync Positive/Negative, TTL Level; Sync on Green Video (Positive) 0.7 Vp-p and sync Negative 0.3 Vp-p
- Analog HD video
    - Video level: 1 Vp-p (sync and video)
    - Sync: Tri-level
    - Sync level: 0.6 Vp-p

5.2.3 Composite Video Input Signal

- Format: Composite, NTSC RS-170A or PAL CCIR 624
- Input Sampling: All inputs sampled as 3:2 pixels (CCIR 601)
- Video levels: 0.5 to 2.0 Vp-p, 1 Vp-p nominal
- Sync level: 0.3 to 0.6 Vp-p

5.2.4 S-Video Input Signal

- Format: S-Video (NTSC RS-170A or PAL CCIR 624)
- Input Sampling: All inputs sampled as 3:2 pixels (CCIR 601)
- Video levels: 0.5 to 2.0 Vp-p, 1 Vp-p nominal
- Sync level: 0.3 to 0.6 Vp-p

5.2.5 Synchronization Range

Both Horizontal and Vertical sync are performed automatically.

- Horizontal: 12 kHz to 125 kHz
- Vertical: up to 200 Hz
- Max pixel clock rate is 162 MHz

5.3 Dimming Range

- OSD control dimming 20% - 100%

5.4 Brightness

- 240 cd/m^2 (Minimum)

5.5 Audio Input/Output Levels (OPTIONAL)

- Line input level is 70mVRMS typical and 350mVRMS max.
- Output level is 10 Watts RMS into 8 ohms

5.6 Display RS-232 Serial HOST interface

- Provides RS-232 Serial interface for control of brightness (backlight control), contrast, and BIT.
- Provides RS-232 Serial interface for interrogation of status of display.

Serial Interface Protocol

Communication with the host is via an asynchronous RS232 standard serial I/O: one start bit, eight data bits, and one stop bit at 115.2 K baud. Only the transmit data (TX) and receive data (RX) signal lines are used (no handshaking). All messages are five bytes in length:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0xXX	0xYY	0x03

Except for the General Status and A/D Converter messages, which is “READ” only, all messages can be “READ” to read the current value of the variable addressed, or can be “WRITE” to change the value of the variable addressed. The DATA values reflect the value shown on the corresponding On-Screen-Display adjustment bar.

Main Brightness (video signal level):

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0x11	0x1C - 0xE4	0x03

Main Contrast:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0x12	0x1C - 0xE4	0x03

Controls Power:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0x50	OFF = 0x00 ON = 0x01	0x03

Controls Backlight Intensity:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0x52	0x20 - 0xA2	0x03

Controls Volume: (Optional Equipment)

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55 Write = 0xAA	0x53	0x00 - 0xA2	0x03

General A/D Converter:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55	0x02 thru 0x06	0x00 - 0xFF	0x03

General Status:

STX	READ or WRITE	ADDRESS	DATA	ETX
0x02	READ = 0x55	0x00	0x00 - 0xFF	0x03

General Status will provide a GO-NO GO status bit for each of the internal power supply voltages, and a status bit indicating the presence of a MAIN video input.

5.7 Power Consumption

- Input 120 VAC 60Hz at 2.85Amps, 310 W (typ).

5.8 Dimensions

See the dimension drawings at the back of this Users Guide.

5.9 Weight

- Wall Mount: 113 lbs.

5.10 Operating Environment

- Temperature: 0°C, +50°C
- Humidity: 5% to 95% RH non-condensing
- Shock: MIL-S-901D, Grade B, Class I, Type A
- Vibration: MIL-STD-167-1, Type 1
- EMI: Standard: FCC Class A

  Optional: MIL-STD-461E:
  Meets all of the applicable test requirements for surface ships as defined in 461E.

5.11 Non-Operating Environment

- Temperature: -20°C to +60°C
- Humidity: 5% to 95% RH non-condensing

6. TROUBLESHOOTING TIPS

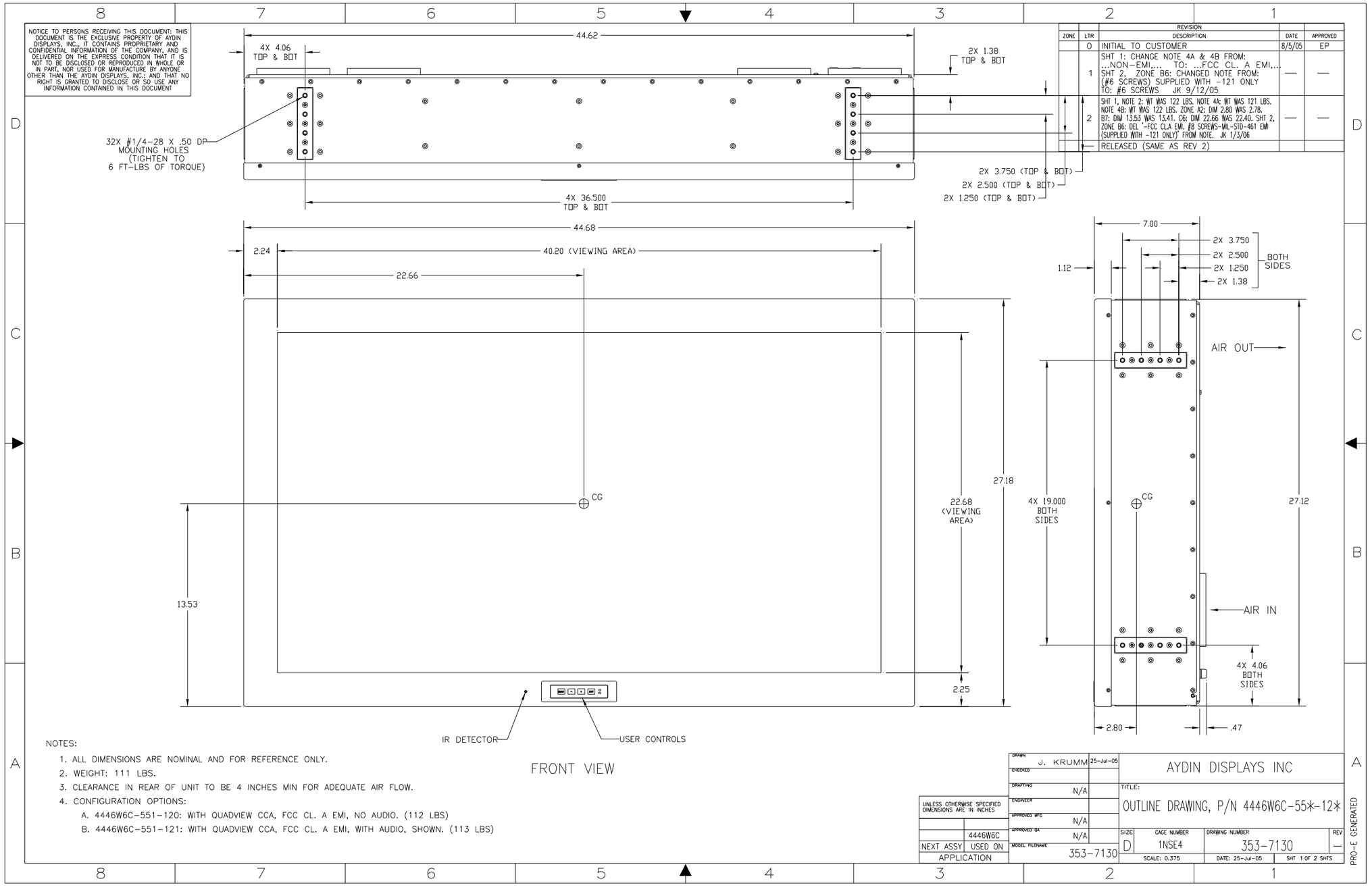
If you experience trouble with your 4446 display, check the following items and the Trouble Shooting Guide in the RGB Spectrum QuadView Users Guide before contacting Aydin Displays or your dealer.

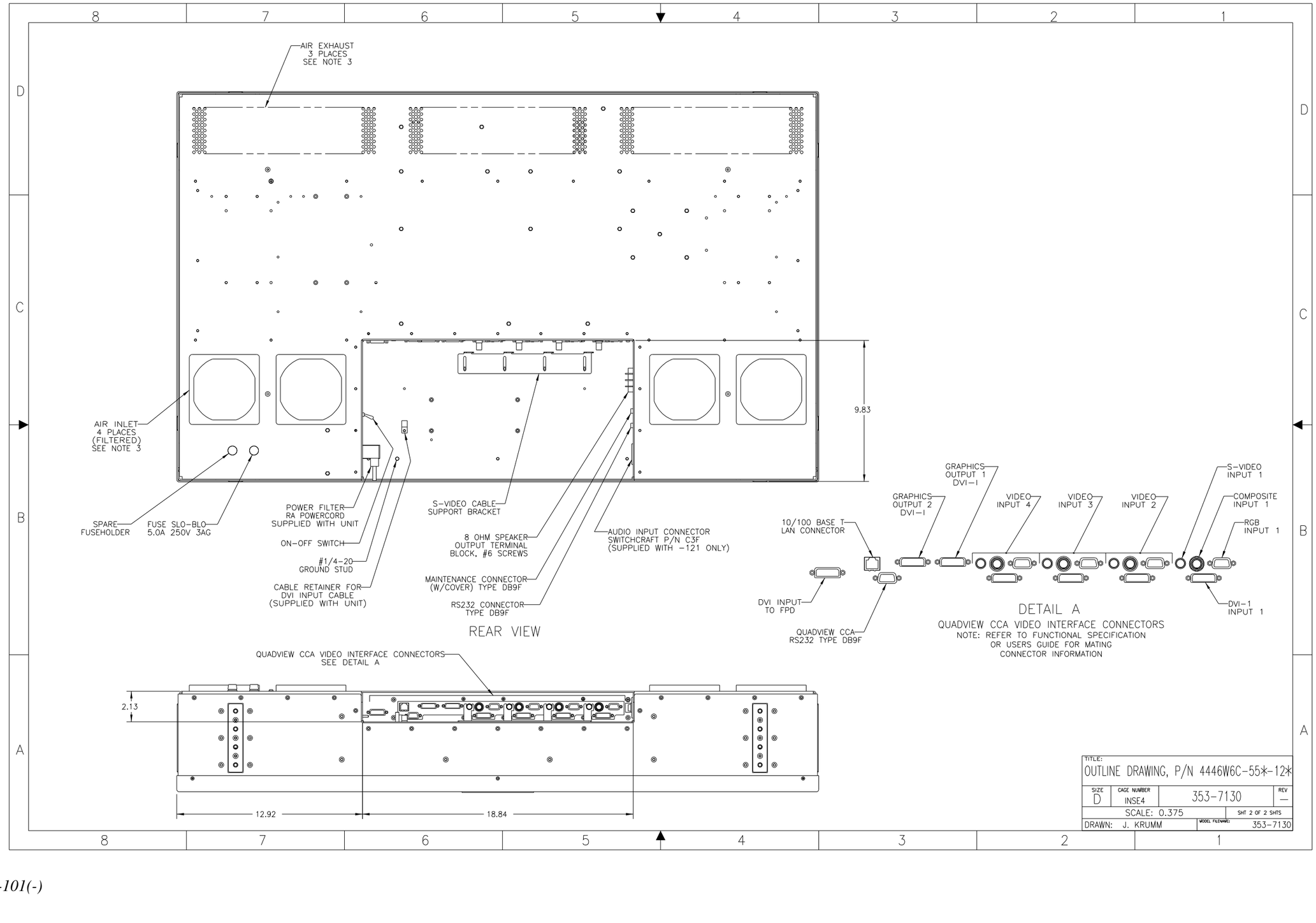
Trouble	Troubleshooting Tip
No picture	• The signal cable should be completely connected to the display card/computer. • The display card should be completely seated in the computer slot. • Display power connector should be plugged in and computer power switch should be in the ON position. • Check the signal cable connector for bent or pushed-in pins. • Check if the correct video input source is selected in the display. • Make certain the computer is not in a power-saving mode (touch the keyboard or mouse.)
Image persistence.	• Image persistence occurs when a ghost of an image remains on the screen even after the monitor has been turned off. Unlike a CRT monitor, a LCD monitor's image persistence is not permanent. To erase an image ghost, turn the monitor off for as long as the image was displayed. If an image was on the monitor for an hour and a ghost of that image remains, the monitor should be turned off for an hour to erase the image. To avoid this problem, use a screen saver whenever the screen is idle.
Image is unstable, unfocused or swimming is apparent.	• Signal cable should be completely attached to the computer. • Use the controls to readjust the display for optimum operation. • Check the monitor and your display card for compatibility and recommended signal timings.
Power LED on monitor is not lit.	• Power cable should be connected and power supply plugged into an AC power source.
Display image is not sized properly.	• Ensure that a supported mode is selected on the display card or system being used. Consult the display card or system manual to change graphics mode.

If these troubleshooting tips do not solve your problem, contact Aydin Displays Customer Support at 610-404-5370 or fax us at 610-404-8186.

7. 4446 DISPLAY DIMENSIONS

For clarity, displays are shown without signal and power cables.


NOTICE TO PERSONS RECEIVING THIS DOCUMENT: THIS DOCUMENT IS THE EXCLUSIVE PROPERTY OF AYDIN DISPLAYS, INC., IT CONTAINS PROPRIETARY AND CONFIDENTIAL INFORMATION OF THE COMPANY, AND IS DELIVERED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE DISCLOSED OR REPRODUCED IN WHOLE OR IN PART, NOR USED FOR MANUFACTURE BY ANYONE OTHER THAN THE AYDIN DISPLAYS, INC.; AND THAT NO RIGHT IS GRANTED TO DISCLOSE OR SO USE ANY INFORMATION CONTAINED IN THIS DOCUMENT
REVISION
ZONE LTR DESCRIPTION DATE APPROVED
0 INITIAL TO CUSTOMER 8/5/05 EP
1 SHT 1: CHANGE NOTE 4A & 4B FROM: ...NON-EMI,... TO: ...FCC CL. A EMI,... SHT 2, ZONE B6: CHANGED NOTE FROM: (#6 SCREWS) SUPPLIED WITH -121 ONLY TO: #6 SCREWS JK 9/12/05 — —
2 SHT 1, NOTE 2: WT WAS 122 LBS. NOTE 4A: WT WAS 121 LBS. NOTE 4B: WT WAS 122 LBS. ZONE A2: DIM 2.80 WAS 2.78. B7: DIM 13.53 WAS 13.41. C6: DIM 22.66 WAS 22.40. SHT 2, ZONE B6: DEL "-FCC CLA EML (#8 SCREWS-MIL-STD-461 EMI (SUPPLIED WITH -121 ONLY)" FROM NOTE. JK 1/3/06 — —
RELEASED (SAME AS REV 2)
44.62
4X 4.06 TOP & BOT
2X 1.38 TOP & BOT
32X #1/4-28 X .50 DP MOUNTING HOLES (TIGHTEN TO 6 FT-LBS OF TORQUE)
2X 3.750 (TOP & BOT)
2X 2.500 (TOP & BOT)
2X 1.250 (TOP & BOT)
4X 36.500 TOP & BOT
44.68
2.24
40.20 (VIEWING AREA)
22.66
CG
13.53
22.68 (VIEWING AREA)
27.18
2.25
IR DETECTOR
USER CONTROLS
FRONT VIEW
7.00
2X 3.750
2X 2.500
2X 1.250
2X 1.38
BOTH SIDES
1.12
AIR OUT
AIR IN
4X 19.000 BOTH SIDES
4X 4.06 BOTH SIDES
27.12
2.80
.47
NOTES:
1. ALL DIMENSIONS ARE NOMINAL AND FOR REFERENCE ONLY.
2. WEIGHT: 111 LBS.
3. CLEARANCE IN REAR OF UNIT TO BE 4 INCHES MIN FOR ADEQUATE AIR FLOW.
4. CONFIGURATION OPTIONS:
A. 4446W6C-551-120: WITH QUADVIEW CCA, FCC CL. A EMI, NO AUDIO. (112 LBS)
B. 4446W6C-551-121: WITH QUADVIEW CCA, FCC CL. A EMI, WITH AUDIO, SHOWN. (113 LBS)
DRAWN J. KRUMM 25-Jul-05
CHECKED
DRAFTING N/A
ENGINEER
APPROVED MFG N/A
APPROVED QA N/A
MODEL FILENAME 353-7130
AYDIN DISPLAYS INC
TITLE: OUTLINE DRAWING, P/N 4446W6C-55*-12*
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
4446W6C
NEXT ASSY USED ON
APPLICATION
SIZE D CAGE NUMBER 1NSE4 DRAWING NUMBER 353-7130 REV —
SCALE: 0.375 DATE: 25-Jul-05 SHT 1 OF 2 SHTS
PRO-E GENERATED


AIR EXHAUST
3 PLACES
SEE NOTE 3
AIR INLET
4 PLACES
(FILTERED)
SEE NOTE 3
SPARE
FUSEHOLDER
FUSE SLO-BLO
5.0A 250V 3AG
POWER FILTER
RA POWERCORD
SUPPLIED WITH UNIT
ON-OFF SWITCH
#1/4-20
GROUND STUD
CABLE RETAINER FOR
DVI INPUT CABLE
(SUPPLIED WITH UNIT)
S-VIDEO CABLE
SUPPORT BRACKET
8 OHM SPEAKER
OUTPUT TERMINAL
BLOCK, #6 SCREWS
MAINTENANCE CONNECTOR
(W/COVER) TYPE DB9F
RS232 CONNECTOR
TYPE DB9F
AUDIO INPUT CONNECTOR
SWITCHCRAFT P/N C3F
(SUPPLIED WITH -121 ONLY)
9.83
REAR VIEW
10/100 BASE T
LAN CONNECTOR
DVI INPUT
TO FPD
QUADVIEW CCA
RS232 TYPE DB9F
GRAPHICS
OUTPUT 2
DVI-I
GRAPHICS
OUTPUT 1
DVI-I
VIDEO
INPUT 4
VIDEO
INPUT 3
VIDEO
INPUT 2
S-VIDEO
INPUT 1
COMPOSITE
INPUT 1
RGB
INPUT 1
DVI-1
INPUT 1
DETAIL A
QUADVIEW CCA VIDEO INTERFACE CONNECTORS
NOTE: REFER TO FUNCTIONAL SPECIFICATION
OR USERS GUIDE FOR MATING
CONNECTOR INFORMATION
QUADVIEW CCA VIDEO INTERFACE CONNECTORS
SEE DETAIL A
2.13
12.92
18.84
TITLE:
OUTLINE DRAWING, P/N 4446W6C-55*-12*
SIZE D
CAGE NUMBER INSE4
353-7130
REV —
SCALE: 0.375
SHT 2 OF 2 SHTS
DRAWN: J. KRUMM
MODEL FILENAME: 353-7130